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L16 ANSWER 1 OF 8 CAPLUS COPYRIGHT 2003 ACS  
AN 1998:816657 CAPLUS  
DN 130:118347  
TI Ferroelectric liquid-crystal composition containing aromatic heterocyclic compounds  
IN Shiratori, Nobuyuki; Ushikubo, Kohei; Fukushima, Akiyuki; Matsui, Junko; Yoshizawa, Atsushi  
PA Japan Energy K. K., Japan  
SO Jpn. Kokai Tokkyo Koho, 17 pp.  
CODEN: JKXXAF  
DT Patent  
LA Japanese  
IC ICM C09K019-34  
ICS G02F001-13  
CC 76-8 (Electric Phenomena)  
Section cross-reference(s): 73, 74  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 10338878	A2	19981222	JP 1997-163567	19970606
PRAI	JP 1997-163567		19970606		
OS	MARPAT 130:118347				
GI					

\* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT \*

AB The compn. contains arom. heterocyclic compds. I, II, III, and IV (R1, 3, 5 = C1-18 alkyl, alkoxy; R2, 4, 6 = C1-18 alkyl; X1 = O, OCO, OCO2; Rf = C1-2 fluoroalkyl; R7 = C3-20 alkyl; R8-10 = H, C1-15 alkyl, C2-15 alkenyl, C7-10 aralkyl; X2 = CO2, O, direct bond; X3 = CO2, OCO, CH2O, OCH2, C.tplbond.C, direct bond; X4 = CO2, CH2O, O; X5 = O, OCO; A, B = halogen, cyano, 6-membered ring compd.; p, q, n = 0, 1). An optical switching device contg. the compn. is also claimed. The compn. shows a chiral smectic liq.-crystal phase in a wide-temp. range, rapid response, and low threshold value voltage.

ST ferroelec liq crystal compn optical switch; hetericyclic arom liq crystal mixt

IT Liquid crystal displays  
Liquid crystal displays  
Optical switches  
(ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

IT Liquid crystals  
(ferroelec.; ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

IT Ferroelectric materials  
(liq.-crystal; ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

IT 52267-53-5 57202-38-7 57202-40-1 57202-48-9 57202-52-5  
57202-56-9 57202-57-0 58415-90-0 58415-91-1 58415-92-2  
99895-85-9 120091-50-1 121640-69-5 124255-17-0 134199-83-0  
**137530-95-1** 138600-17-6 138600-53-0 146886-88-6  
150458-45-0 154883-18-8 219622-69-2 219622-70-5 219622-73-8  
219622-76-1 219622-81-8 219622-83-0  
RL: DEV (Device component use); USES (Uses)  
(ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

IT 219622-71-6 219622-72-7 219622-74-9 **219622-75-0**  
RL: DEV (Device component use); USES (Uses)

(liq.-crystal mixt.; ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

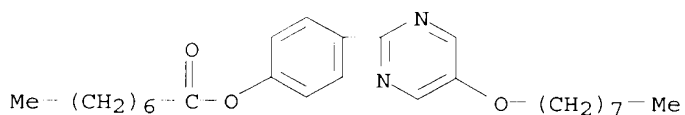
IT 137530-95-1

RL: DEV (Device component use); USES (Uses)

(ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

RN 137530-95-1 CAPLUS

CN Octanoic acid, 4-[5-(octyloxy)-2-pyrimidinyl]phenyl ester (9CI) (CA INDEX NAME)



11 17  
8 7

IT 219622-75-0

RL: DEV (Device component use); USES (Uses)

(liq.-crystal mixt.; ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

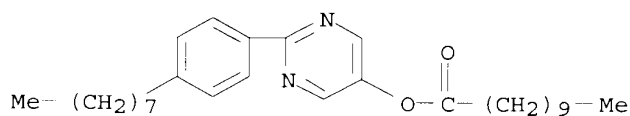
RN 219622-75-0 CAPLUS

CN [1,1'-Biphenyl]-4-carboxylic acid, 4'-(hexyloxy)-, (2R,3R,6S)-6-(hexyloxy)tetrahydro-2-(trifluoromethyl)-2H-pyran-3-yl ester, mixt. with 4-butoxyphenyl 4-(octyloxy)benzoate, 5-heptyl-2-[4-(heptyloxy)phenyl]pyrimidine, 5-heptyl-2-[4-(nonyloxy)phenyl]pyrimidine, 2-[4-(nonyloxy)phenyl]-5-(octyloxy)pyrimidine, 4-[5-(octyloxy)-2-pyridinyl]phenyl octanoate, 4-[5-(octyloxy)-2-pyrimidinyl]phenyl octanoate, 2-(4-octylphenyl)-5-pyrimidinyl octanoate and 2-(4-octylphenyl)-5-pyrimidinyl undecanoate (9CI) (CA INDEX NAME)

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CRN 219622-69-2

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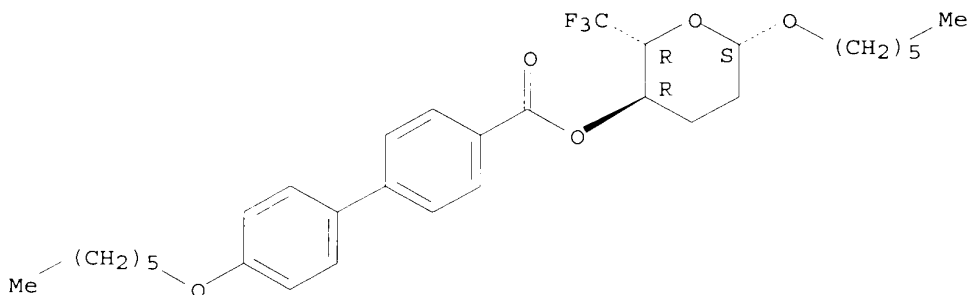


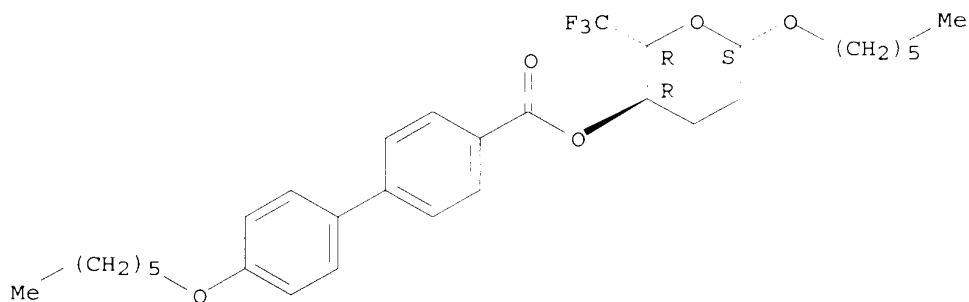
CM 2

CRN 150458-45-0

CMF C31 H41 F3 O5

Absolute stereochemistry.

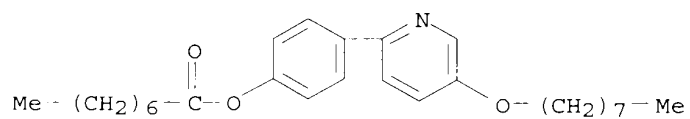




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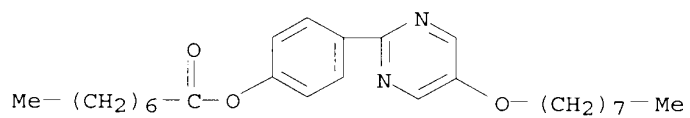
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CM 4

CRN 137530-95-1

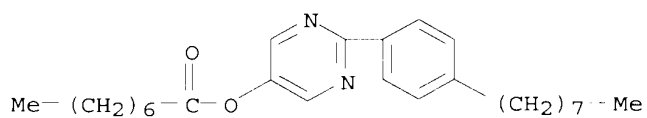
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CM 5

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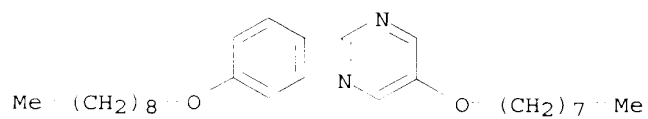
CMF C26 H38 N2 O2



CM 6

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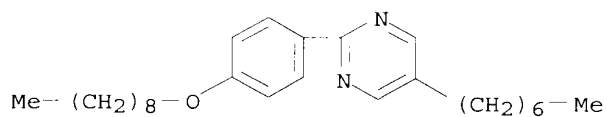
CMF C27 H42 N2 O2



CM 7

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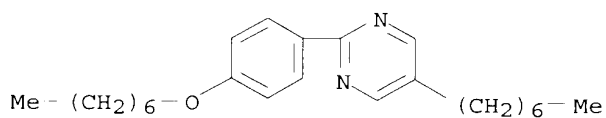
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CM 8

CRN 57202-38-7

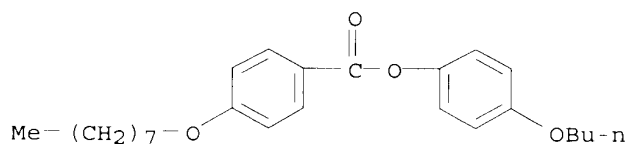
CMF C24 H36 N2 O



CM 9

CRN 52267-53-5

CMF C25 H34 O4



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L16 ANSWER 1 OF 8 CAPLUS COPYRIGHT 2003 ACS

AN 1998:816657 CAPLUS

DN 130:118347

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PA Japan Energy K. K., Japan

SO Jpn. Kokai Tokkyo Koho, 17 pp.

CODEN: JKXXAF

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 LA Japanese  
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 ICS G02F001-13  
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IT Liquid crystals  
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IT Ferroelectric materials  
 (liq.-crystal; ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

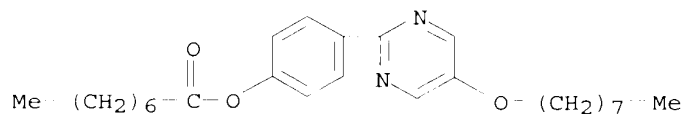
IT 52267-53-5 57202-38-7 57202-40-1 57202-48-9 57202-52-5  
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 99895-85-9 120091-50-1 121640-69-5 124255-17-0 134199-83-0  
**137530-95-1** 138600-17-6 138600-53-0 146886-88-6  
 150458-45-0 154883-18-8 219622-69-2 219622-70-5 219622-73-8  
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IT 219622-71-6 219622-72-7 219622-74-9 **219622-75-0**  
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 (liq.-crystal mixt.; ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

IT **137530-95-1**  
 RL: DEV (Device component use); USES (Uses)  
 (ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

RN 137530-95-1 CAPLUS

CN Octanoic acid, 4-[5-(octyloxy)-2-pyrimidinyl]phenyl ester (9CI) (CA INDEX NAME)



IT 219622-75-0

RL: DEV (Device component use); USES (Uses)

(liq.-crystal mixt.; ferroelec. liq.-crystal compn. contg. arom. heterocyclic compds. for optical switching device)

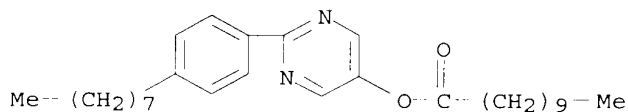
RN 219622-75-0 CAPLUS

CN [1,1'-Biphenyl]-4-carboxylic acid, 4'-(hexyloxy)-, (2R,3R,6S)-6-(hexyloxy)tetrahydro-2-(trifluoromethyl)-2H-pyran-3-yl ester, mixt. with 4-butoxyphenyl 4-(octyloxy)benzoate, 5-heptyl-2-[4-(heptyloxy)phenyl]pyrimidine, 5-heptyl-2-[4-(nonyloxy)phenyl]pyrimidine, 2-[4-(nonyloxy)phenyl]-5-(octyloxy)pyrimidine, 4-[5-(octyloxy)-2-pyridinyl]phenyl octanoate, 4-[5-(octyloxy)-2-pyrimidinyl]phenyl octanoate, 2-(4-octylphenyl)-5-pyrimidinyl octanoate and 2-(4-octylphenyl)-5-pyrimidinyl undecanoate (9CI) (CA INDEX NAME)

CM 1

CRN 219622-69-2

CMF C29 H44 N2 O2

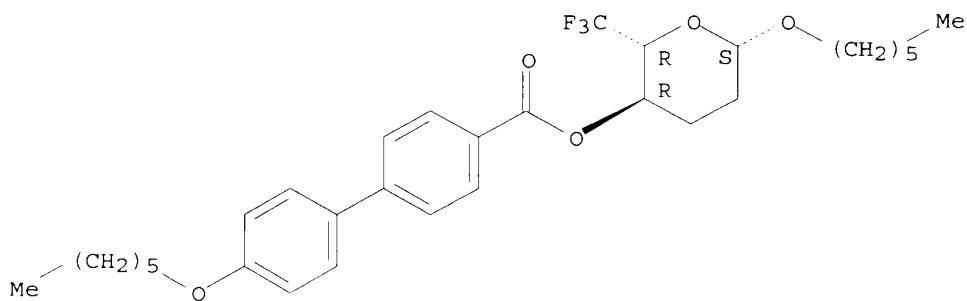


CM 2

CRN 150458-45-0

CMF C31 H41 F3 O5

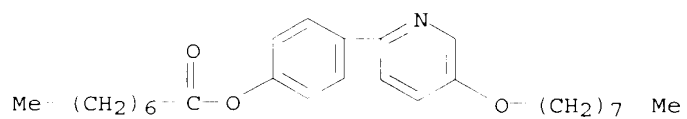
Absolute stereochemistry.



CM 3

CRN 146886-88-6

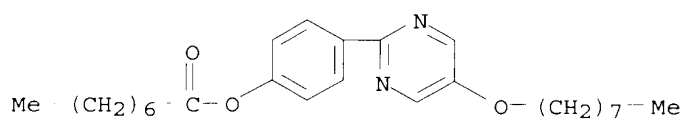
CMF C27 H39 N O3



CM 4

CRN 137530-95-1

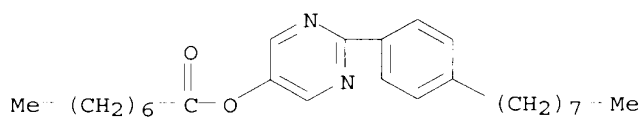
CMF C26 H38 N2 O3



CM 5

CRN 124255-17-0

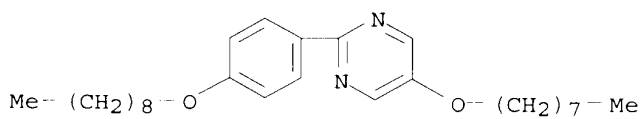
CMF C26 H38 N2 O2



CM 6

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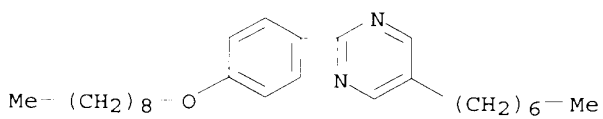
CMF C27 H42 N2 O2



CM 7

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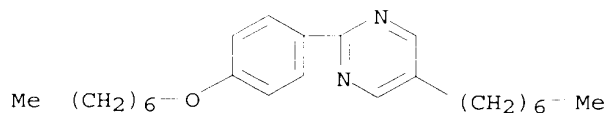
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CM 8

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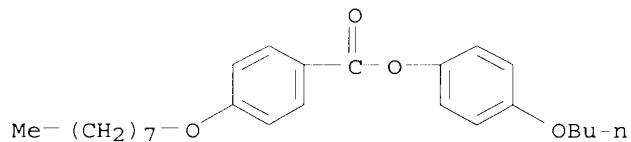
CMF C24 H36 N2 O



CM 9

CRN 52267-53-5

CMF C25 H34 O4



L16 ANSWER 2 OF 8 CAPLUS COPYRIGHT 2003 ACS

AN 1997:172373 CAPLUS

DN 126:179145

TI Ferroelectric liquid crystal composition containing optically active tetrahydropyran derivatives and liquid crystal devices

IN Namekawa, Masaaki; Ito, Keizo; Nayuki, Shinichi; Takeda, Mitsunori; Murayama, Yoshinobu

PA Kashima Sekyu Kk, Japan

SO Jpn. Kokai Tokkyo Koho, 21 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM C09K019-46

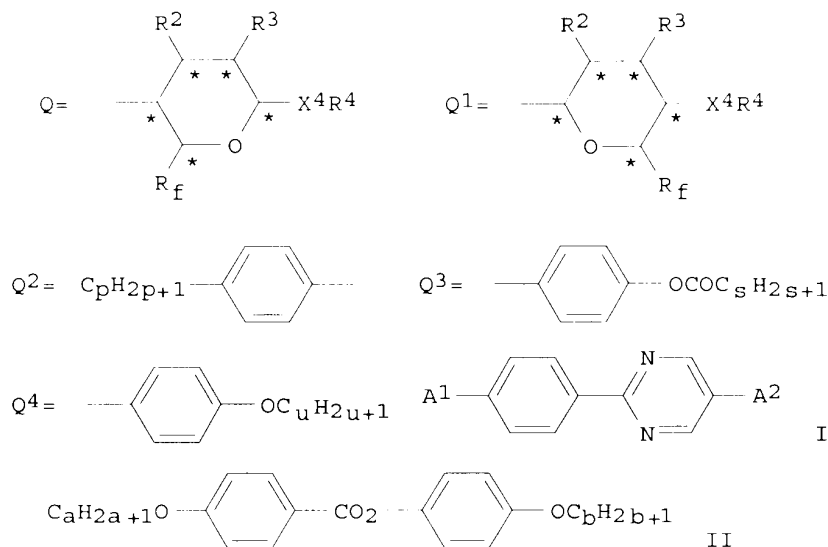
ICS G02F001-13

CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	JP 09013036	A2	19970114	JP 1995-165671	19950630
PRAI	JP 1995-165671		19950630		
OS	MARPAT 126:179145				
GI					





- AB Claimed is a ferroelec. liq. crystal compn. contg. (1) an optically active tetrahydropyran deriv. of formula  $R_1X_1(A-X_2)nBX_3R$  ( $R = Q, Q^1$ ;  $R_f = \text{C1-2 fluoroalkyl}$ ;  $R_1 = \text{C3-20 linear or branched alkyl}$ ;  $R_2, R_3, R_4 = \text{H, C1-15 linear or branched alkyl, C2-15 alkenyl, C7-10 aralkyl}$ ;  $X_1 = \text{CO}_2, \text{O}_2\text{C, O, single bond}$ ;  $X_2 = \text{CO}_2, \text{O}_2\text{C, CH}_2\text{O, OCH}_2, \text{C.tplbond.C, single bond}$ ;  $X_3 = \text{CO}_2, \text{CH}_2\text{O, O}$ ;  $X_4 = \text{O, O}_2\text{C}$ ; \* denotes an asym. C atom; A, B = halo, cyano, 6-membered ring-contg. group optionally substituted by fluoroalkyl;  $n = 0, 1$ ), (2) at least one 2-(4-hydroxyphenyl)pyrimidine ether deriv. (I;  $A^1 = \text{C}_k\text{H}_{2k-10}$ ,  $A^2 = \text{C}_m\text{H}_{2m+1}$ ;  $k, m = 1-15$ ) and at least one 2-phenyl-5-hydroxypyrimidine ether deriv. I ( $A^1 = \text{C}_d\text{H}_{2d+1}$ ,  $A^2 = \text{OC}_e\text{H}_{2e+1}$ ;  $d, e = 1-15$ ), (3) at least one 2-(4-hydroxyphenyl)pyrimidine ether deriv. I ( $A^1 = \text{C}_w\text{H}_{2w+1}\text{CO}_2$ ,  $A^2 = \text{C}_v\text{H}_{2v+1}$ ;  $v, w = 1-15$ ), (4) at least one compd. selected from 2-(4-biphenyl)pyrimidine deriv. I ( $A^1 = Q^2$ ,  $A^2 = \text{C}_q\text{H}_{2q+1}$ ;  $p, q = 1-15$ ), 2,5-bis(4-hydroxyphenyl)pyrimidine ester ether deriv. I ( $A^1 = \text{C}_r\text{H}_{2r+1}$ ,  $A^2 = Q^3$ ;  $r, s = 1-15$ ), and 5-(4-hydroxyphenyl)-2-phenylpyrimidine ether deriv. I ( $A^1 = \text{C}_t\text{H}_{2t+1}$ ,  $A^2 = Q^4$ ;  $t, u = 1-15$ ), and (5) at least one p-alkoxyphenyl p-alkoxybenzoate (II;  $a, b = 1-15$ ). A liq. crystal device with above ferroelec. liq. crystal compn. placed between a pair of electrodes-attached substrates is claimed. This liq. crystal compn. shows ferroelec. chiral smectic C phase at a broad temp. range and thermal stability and is excellent in responsiveness due to large spontaneous polarization and high speed response and is suitable for display device and electrooptical devices.
- ST ferroelec liq crystal compn; optically active tetrahydropyran; hydroxyphenylpyrimidine ether ferroelec liq crystal compn; phenylhydroxypyrimidine ether ferroelec liq crystal compn; biphenylpyrimidine ferroelec liq crystal compn; bishydroxyphenylpyrimidine ester ether ferroelec liq crystal; hydroxyphenylphenylpyrimidine ether ferroelec liq crystal compn; alkoxyphenyl alkoxybenzoate ferroelec liq crystal compn; display device liq crystal; electrooptical device liq crystal
- IT Liquid crystal displays  
Liquid crystal displays  
Liquid crystal displays  
(ferroelec. liq. crystal compn. contg. optically active tetrahydropyran derivs. and liq. crystal devices)
- IT Liquid crystals  
(ferroelec.; ferroelec. liq. crystal compn. contg. optically active tetrahydropyran derivs. and liq. crystal devices)
- IT Ferroelectric materials

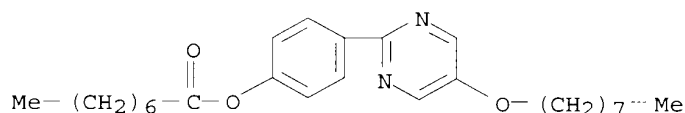
(liq.-crystal; ferroelec. liq. crystal compn. contg. optically active tetrahydropyran derivs. and liq. crystal devices)

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 114415-28-0 114767-82-7 114767-84-9 114767-87-2 120091-49-8  
 120091-50-1 121554-40-3 121554-50-5 **137530-95-1**  
 139226-12-3 142310-13-2 150458-45-0 158039-95-3 186090-20-0  
 187108-92-5  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (component for ferroelec. liq. crystal compn.; ferroelec. liq. crystal compn. contg. optically active tetrahydropyran derivs. and liq. crystal devices)

IT 150458-78-9  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (ferroelec. liq. crystal compn.; ferroelec. liq. crystal compn. contg. optically active tetrahydropyran derivs. and liq. crystal devices)

IT **137530-95-1**  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (component for ferroelec. liq. crystal compn.; ferroelec. liq. crystal compn. contg. optically active tetrahydropyran derivs. and liq. crystal devices)

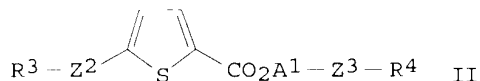
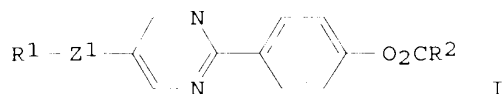
RN 137530-95-1 CAPLUS  
 CN Octanoic acid, 4-[5-(octyloxy)-2-pyrimidinyl]phenyl ester (9CI) (CA INDEX NAME)



L16 ANSWER 3 OF 8 CAPLUS COPYRIGHT 2003 ACS  
 AN 1992:436722 CAPLUS  
 DN 117:36722  
 TI Liquid crystal composition and display device using same  
 IN Yamashita, Masataka; Terada, Masahiro; Mori, Shousei; Katagiri, Kazuharu  
 PA Canon K. K., Japan  
 SO Eur. Pat. Appl., 124 pp.  
 CODEN: EPXXDW  
 DT Patent  
 LA English  
 IC ICM C09K019-34  
 ICS C09K019-42; C09K019-46  
 CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)  
 Section cross-reference(s): 75

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 458347	A2	19911127	EP 1991-108436	19910523
	EP 458347	A3	19920506		
	EP 458347	B1	19960911		
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	JP 3005064	B2	20000131		
	AT 142682	E	19960915	AT 1991-108436	19910523
	US 5413735	A	19950509	US 1993-130427	19931001
PRAI	JP 1990-135881	A	19900524		
	JP 1991-38652	A	19910305		
	US 1991-704600	B1	19910523		
OS	MARPAT 117:36722				
GI					



AB A liq. crystal compn. is described contg. .gtoreq.1 of I [R<sup>1</sup>, R<sup>2</sup> = alkyl optionally contg. alkoxy; each is optically inactive; Z<sup>1</sup> = single bond, O, CO<sub>2</sub>, O<sub>2</sub>C, OCO<sub>2</sub>], and .gtoreq.1 of II [R<sup>3</sup>, R<sup>4</sup> = alkyl; Z<sup>2</sup>, Z<sup>3</sup> = Z<sup>1</sup>, CO; A<sup>1</sup> = A<sub>2</sub> or -A<sub>2</sub>-A<sub>3</sub>- (A<sub>2</sub>, A<sub>3</sub> = 1,4-phenylene, 2,5-pyrimidinediyl, 1,3,4-oxadiazole-2,5-diyl, 1,3,5-thiadiazole-2,5-diyl, 2,5-thiophenediyl, 2,6-naphthalenediyl)]. A display device and a display method by making use of the above compn. are also claimed. The compn. provides improved elec.-field response characteristics.

ST liq crystal compn display

IT Optical imaging devices

(electro-, liq.-crystal, with improved elec. response)

IT	58415-74-0	58415-76-2	58415-83-1	58415-85-3	58415-89-7
	58415-91-1	58415-92-2	58415-93-3	58415-94-4	58415-95-5
	106831-43-0	113701-89-6	113701-90-9	113722-79-5	116504-81-5
	116528-83-7	116528-86-0	116528-91-7	116528-93-9	116529-05-6
	118642-46-9	126397-59-9	127427-82-1	127427-84-3	127427-86-5
	127484-75-7	127484-78-0	127567-02-6	127567-04-8	127567-05-9
	127567-08-2	127756-10-9	128666-42-2	128927-56-0	128927-61-7
	128927-62-8	128927-63-9	128927-64-0	128927-67-3	128927-72-0
	128927-74-2	128927-82-2	128927-83-3	128927-86-6	128927-94-6
	128928-08-5	128928-84-7	128928-87-0	128928-88-1	128928-89-2
	128928-90-5	128928-91-6	128928-92-7	128928-93-8	128928-96-1
	128928-97-2	128928-98-3	128929-00-0	128929-01-1	128929-04-4
	128929-06-6	128929-08-8	128929-13-5	128929-15-7	128929-16-8
	128929-17-9	128929-21-5	128929-26-0	128954-50-7	128954-52-9
	131582-72-4	134199-83-0	134199-85-2	<b>134199-86-3</b>	
	134199-92-1	134199-98-7	134200-00-3	<b>134200-01-4</b>	
	134200-03-6	134200-04-7	134200-05-8	135829-47-9	138033-98-4
	138033-99-5	138034-23-8	142120-21-6	142120-22-7	142120-23-8
	142120-24-9	142120-25-0	142120-26-1	142120-27-2	142120-28-3
	142120-29-4	142120-30-7	142120-31-8	142120-32-9	142120-33-0
	142120-34-1	142120-35-2	142120-36-3	142120-37-4	142120-38-5
	142120-39-6	142120-40-9	142148-21-8	142148-22-9	142148-23-0
	142148-24-1	142148-25-2			

RL: USES (Uses)

(liq.-crystal compn. contg.)

IT	18794-77-9P	26447-67-6P	90619-86-6P	100943-46-2P	113701-95-4P
	128929-28-2P				

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(prepn. and reaction of, liq.-crystal compn. material from)

IT	116528-85-9P	127427-69-4P	128666-40-0P	128927-80-0P	129470-93-5P
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RL: SPN (Synthetic preparation); PREP (Preparation)

(prepn. and use of, in liq.-crystal compn.)

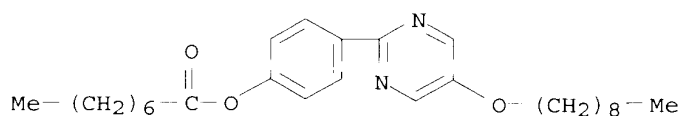
IT **134199-86-3 134200-01-4**

RL: USES (Uses)

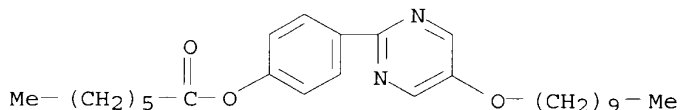
(liq.-crystal compn. contg.)

RN 134199-86-3 CAPLUS

CN Octanoic acid, 4-[5-(nonyloxy)-2-pyrimidinyl]phenyl ester (9CI) (CA INDEX NAME)

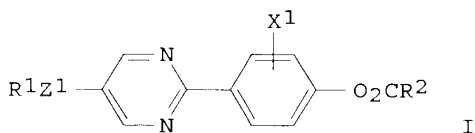


RN 134200-01-4 CAPLUS  
 CN Heptanoic acid, 4-[5-(decyloxy)-2-pyrimidinyl]phenyl ester (9CI) (CA  
 INDEX NAME)



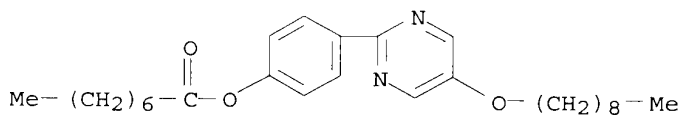
L16 ANSWER 4 OF 8 CAPLUS COPYRIGHT 2003 ACS  
 AN 1992:162649 CAPLUS  
 DN 116:162649  
 TI Liquid crystal composition and liquid crystal device containing the same  
 IN Yamashita, Masataka; Terada, Masahiro; Mori, Shousei; Katagiri, Tazuharu  
 PA Canon K. K., Japan  
 SO Eur. Pat. Appl., 162 pp.  
 CODEN: EPXXDW  
 DT Patent  
 LA English  
 IC ICM C09K019-34  
 ICS C09K019-42; G02F001-1337  
 CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other  
 Reprographic Processes)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 440136	A2	19910807	EP 1991-101076	19910128
	EP 440136	A3	19920318		
	EP 440136	B1	19970402		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE				
	JP 03221589	A2	19910930	JP 1990-19883	19900129
	JP 2974353	B2	19991110		
	US 5391318	A	19950221	US 1991-645720	19910125
	AT 151104	E	19970415	AT 1991-101076	19910128
PRAI	JP 1990-19883		19900129		
OS	MARPAT 116:162649				
GI					



AB A liq. crystal compn. having a chiral smectic phase is described comprising .gtoreq.1 liq. crystal compds. from I [R1, R2 = alkyl; Z1 = bond, O, O2C, CO2; X1 = halogen]. A display device contg. the liq. crystal is also claimed. The compn. has improved elec. properties and can be used for display devices or optical shutter.

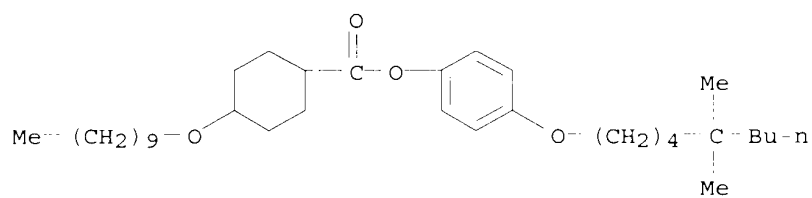
ST liq crystal display optical shutter  
 IT Optical imaging devices  
     (electro-, liq.-crystal, chiral smectic compds.)  
 IT 51462-27-2 51518-75-3 57202-40-1 57202-48-9 57202-49-0  
 57202-50-3 57202-51-4 57202-52-5 57202-58-1 57202-60-5  
 57202-61-6 58415-74-0 58415-91-1 58415-92-2 113701-89-6  
 116504-86-0 116528-86-0 116528-87-1 116528-93-9 116528-94-0  
 116529-07-8 118266-63-0 120675-49-2 121554-34-5 121639-95-0  
 121640-74-2 126397-59-9 127162-41-8 127345-39-5 127427-69-4  
 127427-82-1 127427-84-3 127427-86-5 127484-75-7 127567-01-5  
 127567-02-6 127567-05-9 127567-08-2 127756-10-9 129470-93-5  
 130600-62-3 131582-72-4 132419-45-5 134199-83-0 134199-85-2  
**134199-86-3** 134199-90-9 134199-92-1 134199-99-8  
 134200-03-6 134200-06-9 138033-93-9 138033-94-0 138033-95-1  
 138033-96-2 138033-97-3 138033-98-4 138033-99-5 138034-00-1  
 138034-01-2 138034-02-3 138034-03-4 138034-04-5 138034-05-6  
 138034-06-7 138034-07-8 138034-08-9 138034-09-0 138034-10-3  
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 138034-31-8 138034-32-9 138034-33-0 138034-34-1 138034-35-2  
 138034-36-3 138034-37-4 138034-38-5 138034-39-6 138034-40-9  
 138034-41-0 138034-42-1 138034-43-2 138034-44-3 138034-45-4  
 138073-10-6  
 RL: USES (Uses)  
     (liq.-crystal compn. contg., chiral smectic)  
 IT **134199-86-3**  
 RL: USES (Uses)  
     (liq.-crystal compn. contg., chiral smectic)  
 RN 134199-86-3 CAPLUS  
 CN Octanoic acid, 4-[5-(nonyloxy)-2-pyrimidinyl]phenyl ester (9CI) (CA INDEX  
 NAME)



L16 ANSWER 5 OF 8 CAPLUS COPYRIGHT 2003 ACS  
 AN 1991:667075 CAPLUS  
 DN 115:267075  
 TI Geminal dimethylalkyl compounds and liquid-crystal mixtures and  
 electrooptical devices containing them  
 IN Illian, Gerhard; Mueller, Ingrid; Harada, Takamasa  
 PA Hoechst A.-G., Germany  
 SO Ger. Offen., 18 pp.  
 CODEN: GWXXBX  
 DT Patent  
 LA German  
 IC ICM C07D239-34  
 ICS C07D239-38; C07D239-26; C07D405-12; C07D285-12; C07D417-12;  
 C07D401-12; C07D237-08; C07D241-12; C07C069-92; C09K019-06;  
 C07D237-10  
 ICA C07D237-10; C07D241-14; C07D403-12  
 ICI C07D239-24; C07D303-02; C07D317-10; C07D307-04; C07D307-26  
 CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other  
 Reprographic Processes)  
 Section cross-reference(s): 73, 75  
 FAN.CNT 1

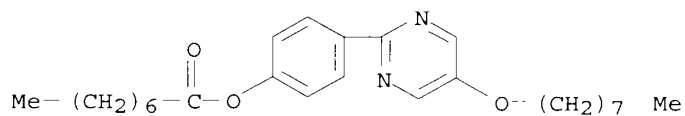
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 4003012	A1	19910808	DE 1990-4003012	19900202
	CA 2075198	AA	19910803	CA 1991-2075198	19910124
	WO 9111441	A1	19910808	WO 1991-EP129	19910124
	W: CA, JP, KR, NO, US				
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, NL, SE				
	EP 513069	A1	19921119	EP 1991-902950	19910124
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE				
	JP 05504349	T2	19930708	JP 1991-503083	19910124
	JP 2995089	B2	19991227		
	US 5366657	A	19941122	US 1992-915687	19920724
	NO 9202978	A	19920728	NO 1992-2978	19920728
PRAI	DE 1990-4003012		19900202		
	WO 1991-EP129		19910124		
OS	MARPAT 115:267075				
AB	The compds. have the general formula R1A1(M1)k(A2)l(M2)m(A3)nGC(Me)2R6, where R1 = C2-16 alkyl or alkenyl; A1-3 = 1,4-phenylene, 1,4-cyclohexylene, or pyrimidin-2,5-diyl; M1,M2 = COO or OCO; G = C1-16 alkylene; k,l,m,n = 0 or 1; and R6 = linear C1-10 alkyl.				
ST	geminal dimethylalkyl compd liq crystal mixt; methylalkyl compd liq crystal; display liq crystal geminal dimethylalkyl compd				
IT	Liquid crystals				
	(geminal dimethylalkyl compds.)				
IT	Optical imaging devices				
	(electro-, liq.-crystal, geminal dimethylalkyl compds. for)				
IT	Optical instruments				
	(electro-, switches, liq.-crystal, geminal dimethylalkyl compds. for)				
IT	137530-97-3		137530-99-5		
	RL: MSC (Miscellaneous)				
	(liq. crystal, for electrooptical display and switching devices)				
IT	57202-21-8	57202-50-3	57202-52-5	113844-49-8	113844-51-2
	114415-28-0	114767-84-9	118808-38-1	119388-64-6	120091-49-8
	121083-89-4	121083-95-2	121084-01-3	137489-04-4	137489-05-5
	137489-06-6				
	RL: USES (Uses)				
	(liq.-crystal mixts. contg., for display and switching devices)				
IT	137488-81-4				
	RL: USES (Uses)				
	(liq.-crystal mixts. contg., for electrooptical display and switching devices)				
IT	137488-69-8P	137488-70-1P	137488-71-2P	137488-72-3P	137488-73-4P
	137488-74-5P	137488-75-6P	137488-76-7P	137488-77-8P	137488-78-9P
	137488-79-0P	137488-80-3P	137488-81-4P	137488-82-5P	137488-83-6P
	137488-84-7P	137488-85-8P	137488-86-9P	137488-87-0P	137488-88-1P
	137488-89-2P	137488-90-5P	137488-91-6P	137488-92-7P	137488-93-8P
	137488-94-9P	137488-95-0P	137488-96-1P	137488-97-2P	137488-98-3P
	137488-99-4P	137489-00-0P	137489-01-1P	137489-02-2P	137489-03-3P
	RL: PREP (Preparation)				
	(prepn. of, for liq.-crystal mixts. and display devices)				
IT	137530-97-3				
	RL: MSC (Miscellaneous)				
	(liq. crystal, for electrooptical display and switching devices)				
RN	137530-97-3 CAPLUS				
CN	Cyclohexanecarboxylic acid, 4-(decyloxy)-, 4-[(5,5-dimethylnonyl)oxy]phenyl ester, mixt. with 2-(4-butoxyphenyl)-5-(octyloxy)pyrimidine, 2-[4-(decyloxy)phenyl]-5-(octyloxy)pyrimidine, 2-[4-(dodecyloxy)phenyl]-5-(octyloxy)pyrimidine, trans-4-(5-dodecyl-2-pyrimidinyl)phenyl 4-pentylcyclohexanecarboxylate, 2-[4-(hexyloxy)phenyl]-5-(octyloxy)pyrimidine, 5-(octyloxy)-2-[4-(octyloxy)phenyl]pyrimidine and 4-[5-(octyloxy)-2-pyrimidinyl]phenyl octanoate (9CI) (CA INDEX NAME)				

CRN 137530-96-2  
CMF C34 H58 O4



CM 2

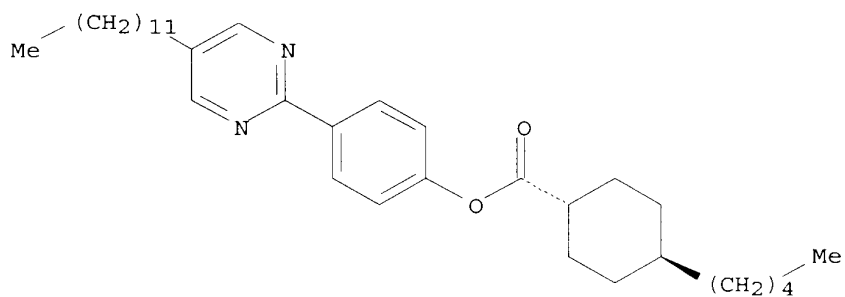
CRN 137530-95-1  
CMF C26 H38 N2 O3



CM 3

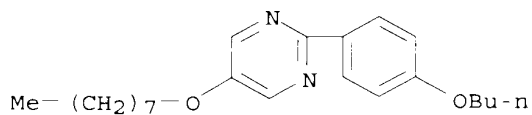
CRN 121083-95-2  
CMF C34 H52 N2 O2

Relative stereochemistry.



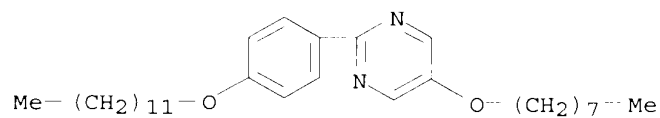
CM 4

CRN 121083-89-4  
CMF C22 H32 N2 O2



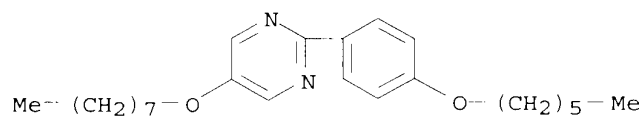
CM 5

CRN 120091-51-2  
CMF C30 H48 N2 O2



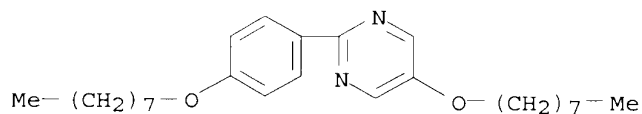
CM 6

CRN 120091-49-8  
CMF C24 H36 N2 O2



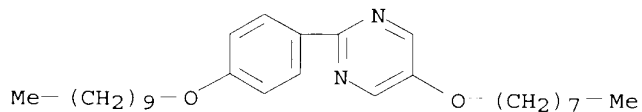
CM 7

CRN 114767-84-9  
CMF C26 H40 N2 O2



CM 8

CRN 114415-28-0  
CMF C28 H44 N2 O2



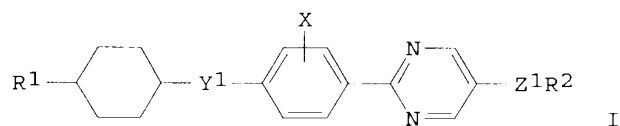
L16 ANSWER 6 OF 8 CAPLUS COPYRIGHT 2003 ACS  
AN 1991:482783 CAPLUS  
DN 115:82783  
TI Mesomorphic compounds and liquid-crystal compositions and devices  
containing them  
IN Mori, Shosei; Takiguchi, Takao; Iwaki, Takashi; Yamada, Yoko; Togano,  
Takeshi; Yamashita, Masataka; Terada, Masahiro; Katagiri, Kazuharu  
PA Canon K. K., Japan  
SO Eur. Pat. Appl., 194 pp.



CODEN: EPXXDW  
 DT Patent  
 LA English  
 IC ICM C07D239-26  
 ICS C07D239-34; C09K019-34; C09K019-42  
 CC 75-11 (Crystallography and Liquid Crystals)  
 Section cross-reference(s): 74

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 401522	A1	19901212	EP 1990-108594	19900507
	EP 401522	B1	19951206		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE				
	JP 03072466	A2	19910327	JP 1990-16557	19900126
	CA 2016106	AA	19901108	CA 1990-2016106	19900504
	AU 9054775	A1	19901108	AU 1990-54775	19900507
	AU 624239	B2	19920604		
	NO 9002017	A	19901109	NO 1990-2017	19900507
	NO 179408	B	19960624		
	NO 179408	C	19961002		
	AT 131160	E	19951215	AT 1990-108594	19900507
	US 5250219	A	19931005	US 1992-863325	19920402
PRAI	JP 1989-115682		19890508		
	JP 1990-16557		19900126		
	US 1990-518941		19900504		
OS	MARPAT 115:82783				
GI					



AB The mesomorphic compds. have the general formula I, where R1,R2 = C1-16 alkyl which may have a substituent; Y1 = COO, OCO, CH2O, or OCH2; Z1 = single bond, O, COO, OCO, or OCOO; and X = halogen, CN, or Me.

ST mesomorphic compd liq crystal compn device

IT Liquid crystals

(phenylpyrimidine derivs.)

IT Optical imaging devices

(electro-, liq.-crystal, phenylpyrimidine derivs. for)

IT 134206-91-0 134226-93-0 134264-50-9

RL: PRP (Properties)

(liq. crystal, for display devices)

IT	51462-26-1	51462-27-2	51518-75-3	57202-23-0	57202-30-9
	57202-32-1	57202-37-6	57202-39-8	57202-48-9	57202-49-0
	57202-50-3	57202-51-4	57202-52-5	57202-53-6	57202-56-9
	57202-58-1	57202-60-5	57202-62-7	58415-74-0	58415-76-2
	58415-91-1	58415-92-2	80883-64-3	96757-95-8	99895-85-9
	108409-94-5	108572-55-0	113722-79-5	114415-26-8	114767-88-3
	116504-85-9	116504-92-8	116504-97-3	116528-86-0	116528-87-1
	116528-94-0	116528-96-2	116529-02-3	116529-05-6	116692-13-8
	117503-17-0	117503-41-0	117794-22-6	118642-51-6	121214-92-4
	121554-41-4	121639-79-0	121639-93-8	121639-94-9	121639-95-0
	121640-01-5	121640-73-1	121640-76-4	124569-13-7	127427-84-3
	127484-75-7	129470-93-5	130600-62-3	131500-99-7	132419-43-3
	132419-44-4	132419-45-5	134198-72-4	134198-74-6	134198-75-7
	134198-76-8	134198-77-9	134198-78-0	134198-80-4	134198-81-5
	134198-82-6	134198-83-7	134198-84-8	134198-85-9	134198-86-0
	134198-87-1	134198-88-2	134198-89-3	134198-90-6	134198-91-7

134198-92-8	134198-93-9	134198-94-0	134198-95-1	134198-96-2
134198-97-3	134198-98-4	134198-99-5	134199-00-1	134199-01-2
134199-02-3	134199-03-4	134199-04-5	134199-05-6	134199-06-7
134199-07-8	134199-08-9	134199-09-0	134199-10-3	134199-11-4
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134199-17-0	134199-18-1	134199-19-2	134199-20-5	134199-21-6
134199-22-7	134199-23-8	134199-24-9	134199-25-0	134199-26-1
134199-27-2	134199-28-3	134199-29-4	134199-30-7	134199-31-8
134199-32-9	134199-33-0	134199-34-1	134199-35-2	134199-36-3
134199-37-4	134199-38-5	134199-39-6	134199-40-9	134199-41-0
134199-42-1	134199-43-2	134199-44-3	134199-45-4	134199-46-5
134199-47-6	134199-48-7	134199-49-8	134199-50-1	134199-51-2
134199-52-3	134199-53-4	134199-54-5	134199-55-6	134199-56-7
134199-57-8	134199-58-9	134199-59-0	134199-60-3	134199-61-4
134199-62-5	134199-63-6	134199-64-7	134199-65-8	134199-66-9
134199-67-0	134199-68-1	134199-69-2	134199-70-5	134199-71-6
134199-72-7	134199-73-8	134199-74-9	134199-75-0	134199-76-1
134199-78-3	134199-80-7	134199-81-8	134199-83-0	134199-84-1
134199-85-2	<b>134199-86-3</b>	134199-87-4	134199-88-5	
134199-89-6	134199-90-9	134199-91-0	134199-92-1	134199-93-2
134199-94-3	134199-95-4	134199-96-5	134199-97-6	134199-98-7
134199-99-8	134200-00-3	<b>134200-01-4</b>	134200-02-5	
134200-03-6	134200-04-7	134200-05-8	134200-06-9	134200-07-0
134216-09-4	134216-10-7	134216-11-8	134216-12-9	134216-13-0
134216-14-1	134216-15-2	134216-16-3	134216-17-4	135266-48-7

RL: PRP (Properties)

(liq.-crystal comps. contg.)

IT 127427-69-4P 134198-73-5P 134198-79-1P 134199-77-2P 134288-65-6P

RL: SPN (Synthetic preparation); PREP (Preparation)

(prepn. of, for liq.-crystal comps. and devices)

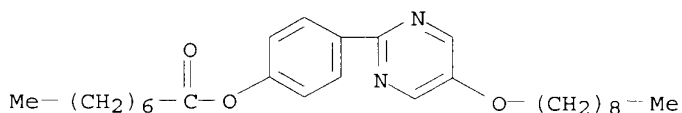
IT **134199-86-3 134200-01-4**

RL: PRP (Properties)

(liq.-crystal comps. contg.)

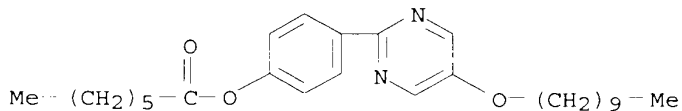
RN 134199-86-3 CAPLUS

CN Octanoic acid, 4-[5-(nonyloxy)-2-pyrimidinyl]phenyl ester (9CI) (CA INDEX NAME)



RN 134200-01-4 CAPLUS

CN Heptanoic acid, 4-[5-(decyloxy)-2-pyrimidinyl]phenyl ester (9CI) (CA INDEX NAME)



L16 ANSWER 7 OF 8 CAPLUS COPYRIGHT 2003 ACS

AN 1991:482387 CAPLUS

DN 115:82387

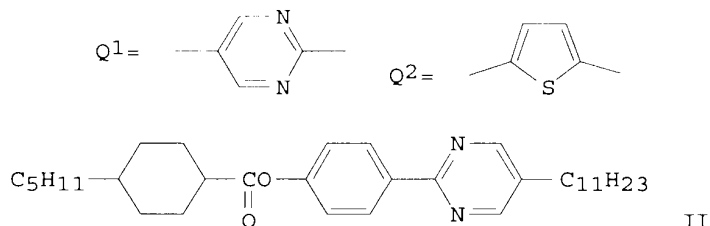
TI Ferroelectric liquid crystal composition

IN Takiguchi, Takao; Yamada, Yoko; Tokano, Goji; Mori, Yoshimasa; Iwaki, Takashi

PA Canon K. K., Japan  
 SO Jpn. Kokai Tokkyo Koho, 33 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM C09K019-34  
 ICS C07C069-92; C09K019-20; C09K019-46  
 ICA C07D213-30; C07D213-55; C07D213-79; C07D213-80; C07D239-26; C07D239-28;  
 C07D239-34; C07D271-10; C07D285-12; C07D333-00; G02F001-13  
 CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other  
 Reprographic Processes)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 02272088	A2	19901106	JP 1989-95019	19890414
PRAI	JP 1989-95019		19890414		
OS	MARPAT 115:82387				
GI					



AB The title compn. contains .gtoreq.1 compd. R1X1AYA'X2R2 (I) (R1, R2 = C1-16 alkyl; X1 = a single bond, O; X2 = a single bond, O, OCO, CO2, OCO, CO; A = cis-1,4-cyclohexylene; Y = CO2, OCO, CH2O, OCH2; A' = A1, A1A2; A1, A2 = Q1, Q2, etc.). Display devices contg. the title compn. have a short response time. Pyrimidine deriv. II is an example of I.

ST ferroelec liq crystal compn pyridine; benzene deriv liq crystal compn

IT Optical imaging devices

(electro-, ferroelec. liq. crystal compns. contg. pyrimidine and benzene derivs. for)

IT	80883-64-3	96757-95-8	108409-94-5	108572-55-0	108572-57-2
	113722-79-5	116504-85-9	116504-97-3	116529-02-3	116692-13-8
	117503-17-0	117794-22-6	117809-53-7	121083-94-1	121083-95-2
	121214-86-6	121214-92-4	121639-79-0	121639-93-8	121639-94-9
	126492-36-2	127344-74-5	127427-69-4	127484-75-7	127863-19-8
	129412-05-1	135350-62-8	135350-63-9	135350-64-0	135350-65-1
	135350-66-2	135350-67-3	135350-68-4	135350-69-5	135350-70-8
	135350-71-9	135350-72-0	135350-73-1	135350-74-2	135350-75-3
	135350-76-4	135350-77-5	135350-78-6	135350-79-7	135350-80-0
	135350-81-1	135350-82-2	135350-83-3	135350-84-4	135377-55-8
	135377-56-9	135377-57-0			

RL: USES (Uses)

(liq. crystal compns. contg., for display device)

IT 135350-85-5 135350-86-6 135350-87-7 135350-88-8 **135377-58-1**

RL: TEM (Technical or engineered material use); USES (Uses)

(liq. crystal compns. contg., for display devices)

IT 75941-74-1P 121083-94-1P 127427-69-4P

RL: PREP (Preparation)

(prepn. of, as liq. crystal for display device)

IT 67589-84-8, cis-4-Pentylcyclohexanecarboxylic acid 75941-33-2

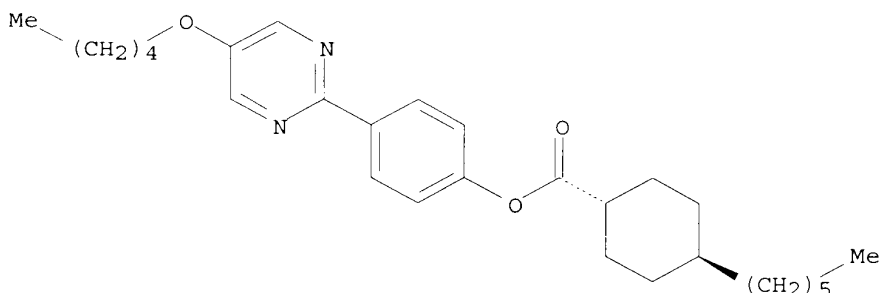
102408-52-6 122318-27-8

RL: RCT (Reactant); RACT (Reactant or reagent)

(reaction of, in prepn. of liq. crystal)

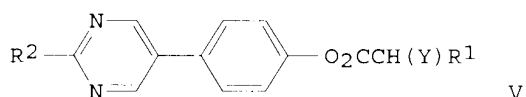
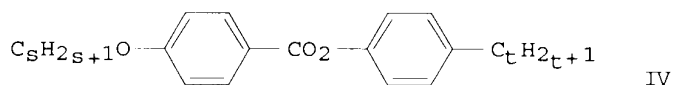
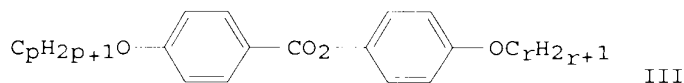
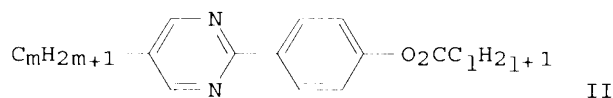
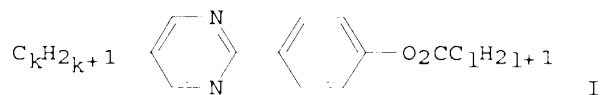
IT 135377-58-1  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (liq. crystal compns. contg., for display devices)  
 RN 135377-58-1 CAPLUS  
 CN Cyclohexanecarboxylic acid, 4-hexyl-, 4-[5-(pentyloxy)-2-pyrimidinyl]phenyl ester, trans- (9CI) (CA INDEX NAME)

Relative stereochemistry.



L16 ANSWER 8 OF 8 CAPLUS COPYRIGHT 2003 ACS  
 AN 1991:92044 CAPLUS  
 DN 114:92044  
 TI Ferroelectric liquid crystal mixture for electrooptical device  
 IN Duebal, Hans Rolf; Escher, Claus; Harada, Takamasa; Hemmerling, Wolfgang; Illian, Gerhard; Mueller, Ingrid; Murakami, Mikio; Ohlendorf, Dieter; Wingen, Rainer  
 PA Hoechst A.-G., Germany  
 SO Ger. Offen., 24 pp.  
 CODEN: GWXXBX  
 DT Patent  
 LA German  
 IC ICM C09K019-06  
 ICS C09K019-58; G02F001-13; G02F001-137  
 ICA C09K019-34; C09K019-20; C07D239-34; C07D239-26; C07C069-96  
 CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)  
 Section cross-reference(s): 25, 28, 75, 76  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 3909356	A1	19900927	DE 1989-3909356	19890322
	CA 2049314	AA	19900923	CA 1990-2049314	19900321
	WO 9011336	A1	19901004	WO 1990-EP458	19900321
	W: CA, JP, KR, NO, US				
	RW: AT, BE, CH, DE, DK, ES, FR, GB, IT, LU, NL, SE				
	EP 464072	A1	19920108	EP 1990-904815	19900321
	EP 464072	B1	19940615		
	R: AT, BE, CH, DE, FR, GB, IT, LI, NL, SE				
	JP 04503826	T2	19920709	JP 1990-504910	19900321
	JP 2836955	B2	19981214		
	NO 9103675	A	19911115	NO 1991-3675	19910918
	US 5286409	A	19940215	US 1991-768561	19911106
PRAI	DE 1989-3909356		19890322		
	WO 1990-EP458		19900321		
OS	MARPAT 114:92044				
GI					



AB The title liq. crystal mixt. comprising a component A, contg. .gtoreq.2 5-alkoxy-2-(alkoxyphenyl)pyrimidines and optionally .gtoreq.1 cyclohexanecarboxylic ester, alkenyloxyphenylpyrimidine, and/or alkylpyrimidinealkoxyphenyl, and a component B, comprising .gtoreq.1 optically active ester of an .alpha.-chlorocarboxylic acid and a phenol deriv., N-acylproline, 1,3-dioxolan-4-carboxylic acid, or oxiran-2-carboxylic acid, also contains I, II, III, IV, and/or V, where k = 6-14; l = 2-14; m = 5-14; p = 7-14; r = 4-14; s, t = 6-14; R<sup>2</sup> = C1-12 alkyl or alkenyl in which 1 or 2 nonadjacent CH<sub>2</sub> groups may be replaced by O and/or S; Y = F, Cl, Br, CN, or CF<sub>3</sub>; and R<sup>1</sup> = branched C1-9 alkyl, benzyl, or Ph.

ST liq crystal mixt carboxylic acid ester; ferroelec liq crystal mixt

IT Optical imaging devices  
(electro-, liq.-crystal, carboxylic acid esters for)

IT Liquid crystals  
(ferroelec., alignment-controlling coatings for, cyclohexylidene group-contg. cardo polymers in)

IT Ferroelectric substances  
(liq.-crystal, alignment-controlling coatings for, cyclohexylidene group-contg. cardo polymers in)

IT 38444-15-4 57202-52-5 58415-91-1 112931-55-2 114415-28-0  
114767-84-9 120091-49-8 120091-51-2 121083-89-4 121083-93-0  
121154-48-1 129470-93-5 131582-72-4 131610-40-7 131610-41-8  
131610-42-9 131610-43-0

RL: USES (Uses)

(liq. crystal compn. contg., for display device)

IT 131500-95-3 131500-96-4 131500-97-5 131501-00-3 131540-92-6  
131540-93-7 131562-24-8 131582-73-5 131614-62-5 **131914-92-6**  
132177-25-4

RL: TEM (Technical or engineered material use); USES (Uses)

(liq. crystal compn., for display device)

IT **131914-92-6**

RL: TEM (Technical or engineered material use); USES (Uses)

(liq. crystal compn., for display device)

RN 131914-92-6 CAPLUS

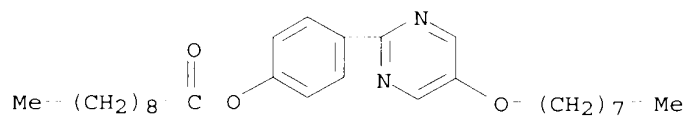
CN Cyclohexanecarboxylic acid, 4-pentyl-, 4-(5-decyl-2-pyrimidinyl)phenyl ester, trans-, mixt. with 2-(4-butoxyphenyl)-5-(octyloxy)pyrimidine, 2-[4-(decyloxy)phenyl]-5-(octyloxy)pyrimidine, 2-[4-(hexyloxy)phenyl]-5-(octyloxy)pyrimidine, 5-(octyloxy)-2-[4-(octyloxy)phenyl]pyrimidine and

4-[5-(octyloxy)-2-pyrimidinyl]phenyl decanoate (9CI) (CA INDEX NAME)

CM 1

CRN 131914-91-5

CMF C28 H42 N2 O3

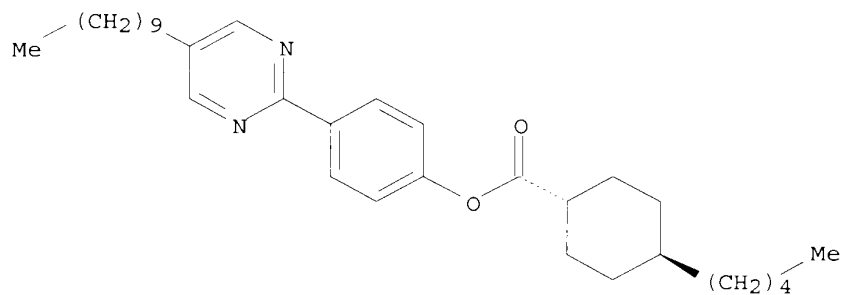


CM 2

CRN 121083-93-0

CMF C32 H48 N2 O2

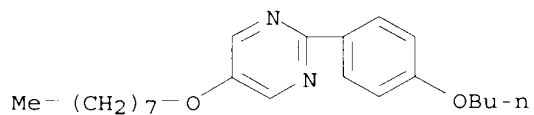
Relative stereochemistry.



CM 3

CRN 121083-89-4

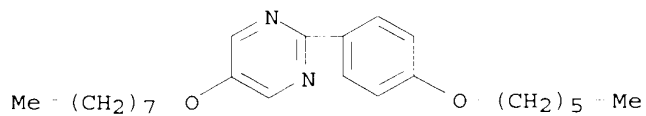
CMF C22 H32 N2 O2



CM 4

CRN 120091-49-8

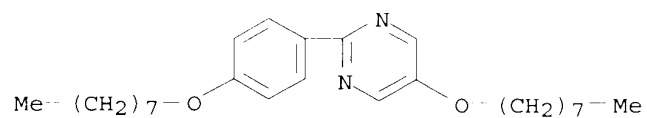
CMF C24 H36 N2 O2



CM 5

CRN 114767-84-9

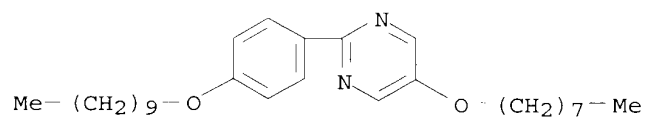
CMF C26 H40 N2 O2



CM 6

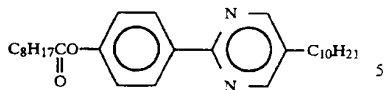
CRN 114415-28-0

CMF C28 H44 N2 O2



9

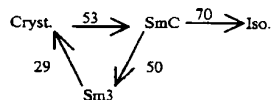
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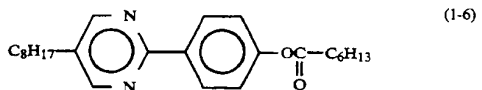
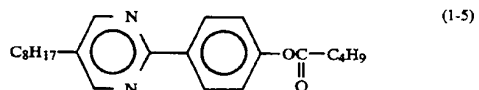
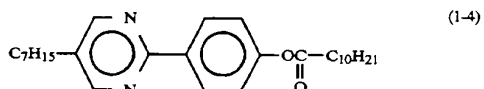
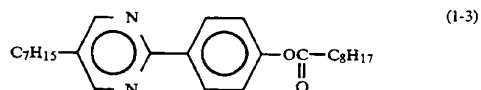
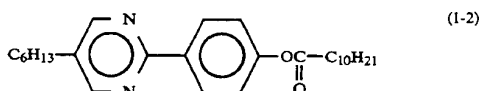
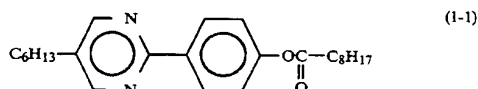
3.00 g (9.60 m mole) of 2-(4-hydroxyphenyl)-5-decylpyrimidine, 1.70 ml (9.74 m mole) of nonanic acid and 100 ml of methylene chloride were mixed together in a flask having an internal volume of 300 ml. While stirring the mixture at room temperature, 2.00 g (9.69 m mole) of N, N'-dicyclohexylcarbodiimide and 0.17 g of 4-pyrrolidinopyridine were sequentially added to the mixture.

The mixture was then stirred for 4 hours at the room temperature so that N, N'-dicyclohexylurea was precipitated. The precipitate was then removed by filtration. The filtered liquid was dried and solidified under a reduced pressure and the residue was refined with silica gel column chromatography using toluene as an eluate. The product was then re-crystallized by an acetone-methanol mixture solvent, whereby 3.78 g of 2-(4-nonanoyloxyphenyl)-5-decylpyrimidine was obtained (yield 87.0%).

Phase transition temperature (°C.)

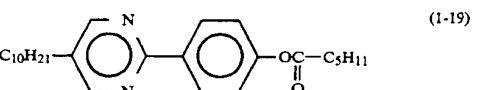
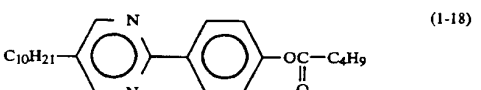
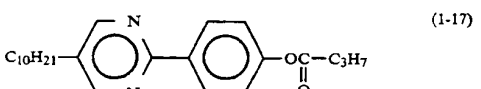
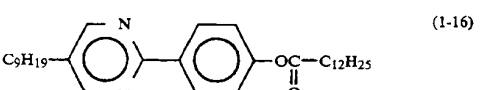
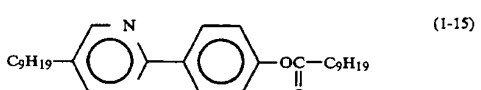
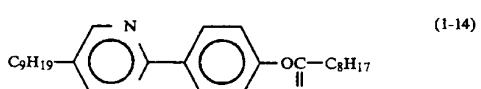
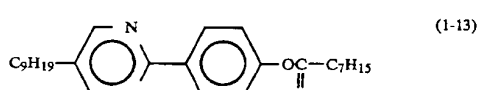
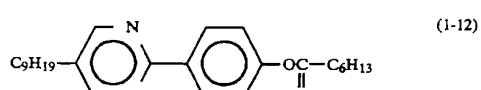
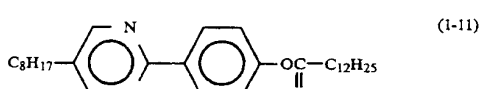
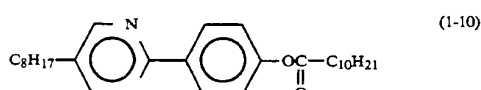
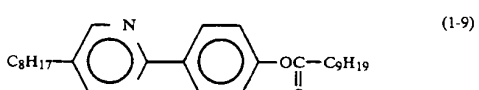
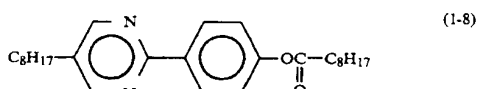
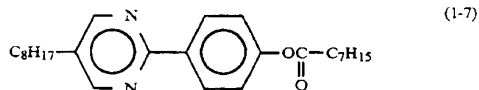


Illustrative examples of the liquid crystal compound having the general formula (I) are shown below.



10

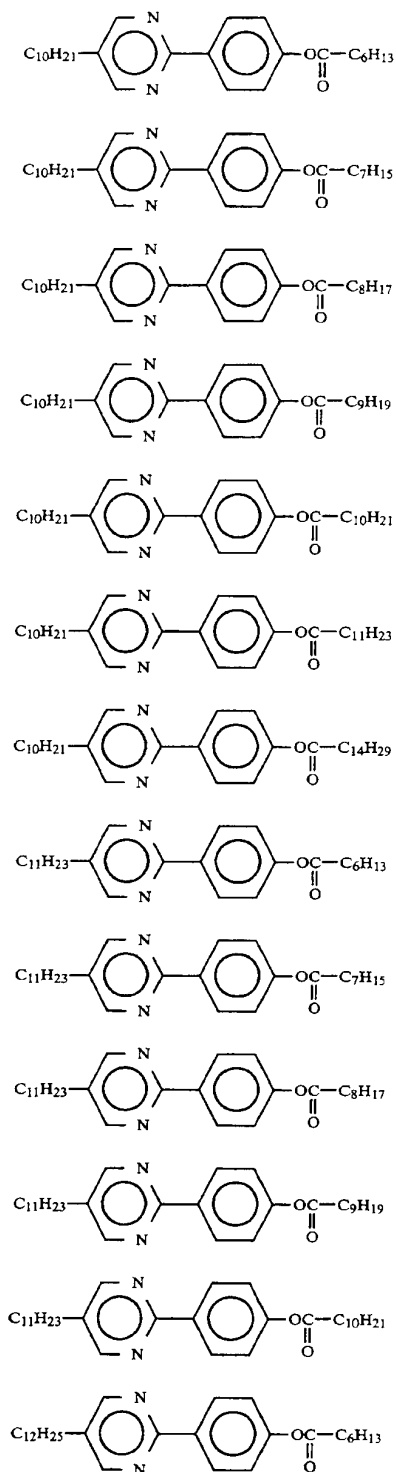
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## 11

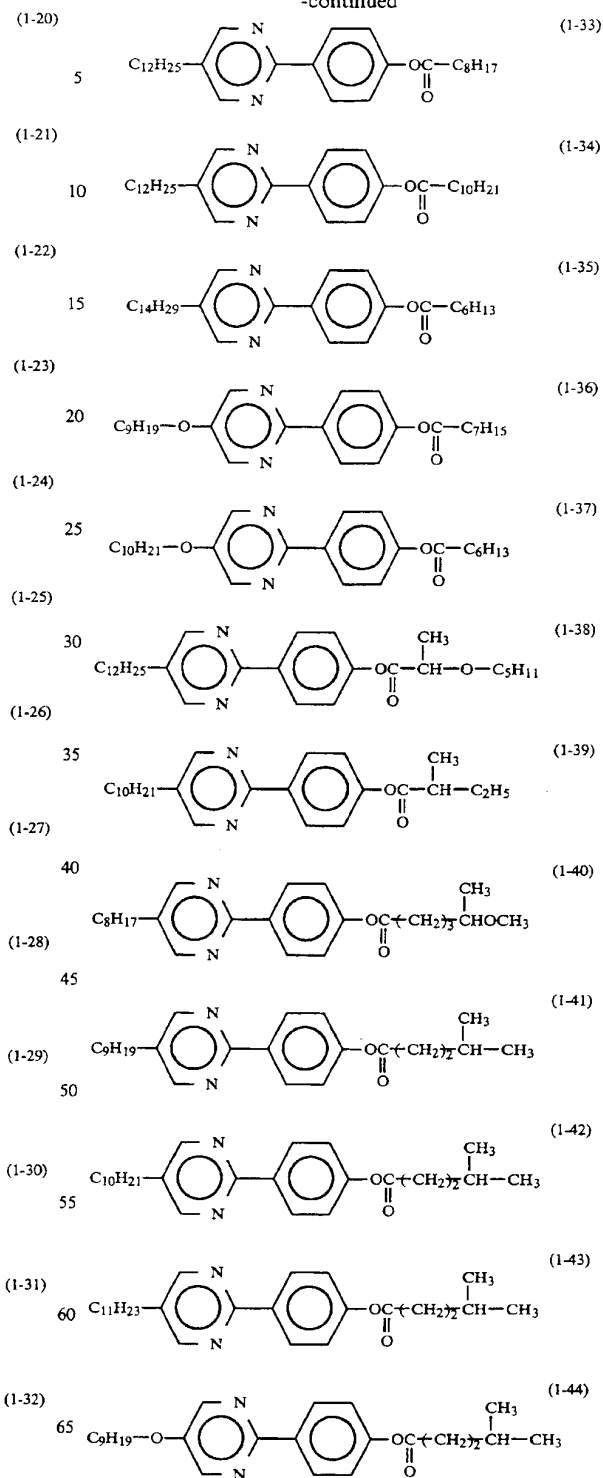
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5,413,735

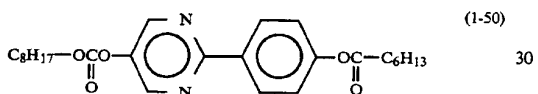
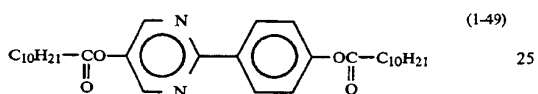
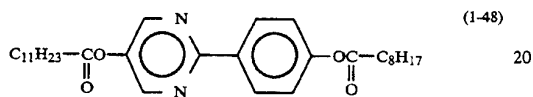
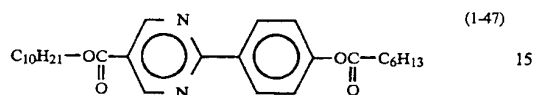
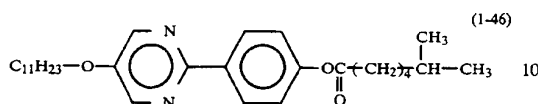
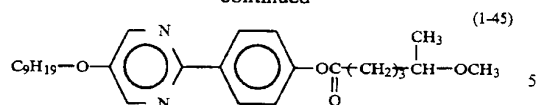
## 12

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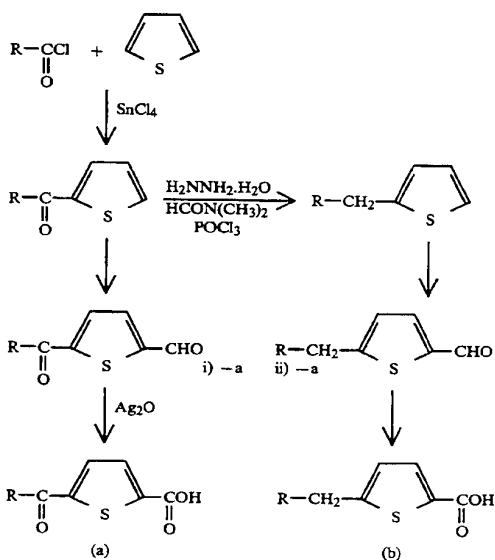
13

-continued



Typical examples of the process for synthesizing the liquid crystal compound having the general formula (II) are shown below.

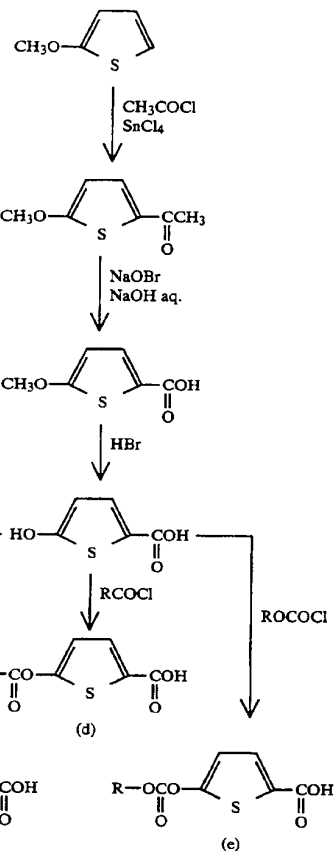
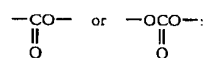
When  $Z_2$  is a single bond or



14

wherein R is a straight-chain or branched-chain alkyl group.

When  $Z_2$  is  $\text{---O---}$ ,



wherein R is a straight-chain or branched-chain alkyl group.

When  $Z_2$  is

